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[REDACTED] EXAMINER

VANOY, TIMOTHY C

ART UNIT	PAPER NUMBER
1754	17

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	09-764,001	Applicant(s)	GEUS
Examiner	VANOY	Group Art Unit	1754

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE THREE MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

THE AMENDMENTS FAXED ON NOV 6 2002 AND OCT. 30, 2002

Responsive to communication(s) filed on NOV 6 2002 AND THE DRAWINGS LETTER MAILED ON DEC 30 2002.
 This action is FINAL.

- Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

- Claim(s) 15, 16, 17, 19-25, 28 AND 29 is/are pending in the application.
Of the above claim(s) _____ is/are withdrawn from consideration.
 Claim(s) _____ is/are allowed.
 Claim(s) 15, 16, 17, 19-25, 28 AND 29 is/are rejected.
 Claim(s) _____ is/are objected to.
 Claim(s) _____ are subject to restriction or election requirement

Application Papers

The proposed drawing correction, filed on DEC 30, 02 is approved disapproved.
 The drawing(s) filed on _____ is/are objected to by the Examiner
 The specification is objected to by the Examiner.
 The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

All Some* None of the:

- Certified copies of the priority documents have been received.
 Certified copies of the priority documents have been received in Application No. 09-142,309.
 Copies of the certified copies of the priority documents have been received
in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

- Information Disclosure Statement(s), PTO-1449, Paper No(s). _____ Interview Summary, PTO-413
 Notice of Reference(s) Cited, PTO-892 Notice of Informal Patent Application, PTO-152
 Notice of Draftsperson's Patent Drawing Review, PTO-948 Other _____

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DETAILED ACTION

Continuation Application

The application (09-764,001) is a continuation of 09-142,309.

Election/Restrictions

Applicant's election of claims 1 and 15-25 in their Amendment faxed on Oct. 30, 2002 (paper no. 11) is acknowledged. Because the Applicants did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Priority

Acknowledgment is made of the Applicants' claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09-142,309, filed on Dec. 7, 1998.

Drawings

The corrected drawings submitted in the Letter mailed on Dec. 30, 2002 (paper no. 16), have been **approved** by the Patent Office draftsperson and the examiner.

Response to Request

On pg. 6 in the amendment faxed on Oct. 30, 2002 (paper no. 11), the applicants noted that the 103 rejection relies on U. S. Pat. 5,965,100 as a 2^o reference. U. S. Pat. 5,965,100 bears a filing date of Oct. 12, 1999 and is a continuation-in-part of 08-

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428,031 filed on Apr. 25, 1995 (now abandoned), whereas the applicants' 09-764,001 bears a filing date of Jan. 17, 2001, and is a continuation of 09-142,309 which was filed on Sept. 3, 1998, which (in turn) claims priority to PCT/NL97/00108 bearing a filing date of Mar. 4, 1997 and claims priority to Netherlands application no. 1002524 filed on Mar. 4, 1996. The applicants' request that the examiner check to see if the portions of U. S. Pat. 5,965,100 cited in the 103 rejection are supported in its parent case, 08-428,031, has been granted and the following 103 rejection has been amended so that the cited portions of U. S. Pat. 5,965,100 have support in 08-428,031. The following 103 rejection has been amended in a manner that does not raise the any new issues for consideration or any new grounds of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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The person having "ordinary skill in the art" has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this application reasonably reflect this level of skill.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 15-17, 19-25 and 28-29 are again rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Pat. 5,891,415 in view of U. S. Pat. 5,965,100 (which is a CIP of 08-428,031 (abandoned) filed on Apr. 25, 1995).

U. S. Pat. 5,891,415 describes a catalyst of the general formula: Fe_AZn_B oxide wherein (preferably) A ranges from 1 to 5 and B is 1, useful for the selective oxidation of hydrogen sulfide with into elemental sulfur (please see col. 3 Ins. 39-53). Col. 4 Ins. 35-38 sets forth that the catalyst may be supported on a carrier (i. e. the "support" of Applicants' claim 1). Col. 4 Ins. 30-33 reports that the catalysts have a surface area in the range of 1 to 5 m^2/g - in a manner suggesting the limitations of Applicants' claims 1, 15 and 16.

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The difference between the Applicants' claims and U. S. Pat. 5,891,415 is that Applicants' claim 1 sets forth that the iron and zinc ions are present in the form of an atomic mixture in the oxidic lattice (which is interpreted to mean that the Applicants' catalyst is zinc ferrierite spinel, $ZnFe_2O_4$ from the discussion of the "atomic mixing" set forth on pg. 15 Ins. 7-25 in the Applicants' specification), whereas U. S. Pat. 5,891,415 does not mention that their catalyst is in spinel form.

Col. 4 Ins. 8-23 in U. S. Pat. 5,965,100 mentions the advantage that sulfate formation on the (spinel) catalyst does not inhibit performance or deactivate the catalyst (whereas the (prior art?) catalysts suffer from sulfation, which renders them ineffective).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to *modify* the catalyst described in U. S. Pat. 5,891,415 by *having the iron and zinc oxide component present in the spinel form* described in col. 3 Ins. 6-27 in U. S. Pat. 5,965,100 (i. e. the "mixed oxide having atomically mixed iron ions and zinc ions in an oxidic lattice" set forth in Applicants' claim 1), in the manner that appears to be set forth in (at least) Applicants' claim 1, because of the taught advantages of the spinel form to avoid the catalyst sulfation problem which appears to plague prior art (non-spinel?) catalysts (please see col. 3 Ins. 6-27 and col. 4 Ins. 8-23 in U. S. Pat. 5,965,100).

The difference between the Applicants' claims and the catalyst of U. S. Pat. 5,891,415 is that Applicants' claim 1 sets forth that the surface area of the catalyst is more than $20\text{ m}^2/\text{g}$ and claims 17, 28 and 29 call for surface areas of more than $25\text{ m}^2/\text{g}$ (whereas col. 4 Ins. 32-33 in U. S. Pat. 5,891,415 reports that the surface area of their

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catalyst ranges from 1 to 5 m²/g), however it is submitted that this difference would have been obvious to one of ordinary skill in the art at the time the invention was made, namely to *modify* the catalyst described in U. S. Pat. 5,891,415 by *increasing its surface area* from the 1 to 5 m²/g set forth in col. 4 Ins. 32-33 to a surface area that is even larger, such as the at least greater than 20 m²/g surface area reported in applicants' claim 1, in the manner embraced in the scope of Applicants' claims 1, 17, 28 and 29, because of the expected advantage of increasing the reactive contact surface on the catalyst to promote the reaction between the reagents that impinge the catalyst.

In view of the comment set forth in col. 34-35 in U. S. Pat. 5,891,415 that pores are attributed to the lattice work of the formed oxides, it is fully expected that the spinel resulting from the combination of U. S. Pat. 5,891,415 in view of U. S. Pat. 5,965,100 will inherently have the same pore characteristics reported in Applicants' claims 17 and 29.

Also, note that col. 5 Ins. 54-56 in U. S. Pat. 5,965,100 fairly suggests that the spinel catalyst may be supported on a porous carrier material, in a manner suggesting the limitations of Applicants' claims 19 and 20. (Note that the disclosure set forth in col. 3 Ins. 25-30 in U. S. Pat. 5,891,415 that catalytic metals were added to a catalyst in amounts ranging from 1.5 to 25 percent by weight fairly suggests that the 0.1 to 50 percent by weight limitation of applicants' claim 20 is conventional and typical for the art.).

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Claims 21-23 are again rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Pat. 5,891,415 in view of U. S. Pat. 5,965,100 and further in view of JP 56-10,338 A.

The cited disclosures of U. S. Pat. 5,891,415 in view of U. S. Pat. 5,965,100 renders obvious the catalyst of (at least) Applicants' claim 1 that is set forth in Applicants' claim 21.

The difference between the Applicants' claims and U. S. Pat.s 5,891,415 and 5,965,100 is that Applicants' claim 21 describes the method by which the catalyst is made.

The English abstract of JP 56-10,338 A describes what appears to be the same method for preparing supported spinels by inserting a salt of a metal (such as Zn, Fe, etc.) into an aqueous solution of aluminum polychloride and then dipping a catalyst support structure into this aqueous solution. Removing the coated catalyst support structure from the aqueous solution and calcining the coated structure to form a spinel of the general formula MAI_2O_4 on the surface of the structure. Evidently, the wet structure was subjected to a preliminary drying step at temperatures of 150°C and then calcined at temperatures ranging from 700 to $1,200^{\circ}\text{C}$ (please ^{see} section no. 5 on pg. 2 in the text of JP 56-10,338 A). Evidently, this spinel coated structure was then dipped into another solution containing a salt of a catalytic metal (and subjected to the same drying and calcining steps) to produce a spinel coated structure having catalytic metal supported on the spinel, in a manner suggesting the limitations of Applicants' claims 21-23.

It would have been obvious to one of ordinary skill in the art at the time the invention was made *to have manufactured* the supported spinel resulting from the combination of U. S. Pat. 5,891,415 in view of 5,965,100 *in the manner set forth* in Applicants' claims 21-23 *because* the disclosure set forth in JP 56-10,338 A *fairly suggests* the claimed method for making supported spinel catalysts. It is obvious to make a composition by conventional and known methods for making that composition.

Claims 24 and 25 have not been rejected under either 35USC102 or 35USC103 because none of the references of record teach or suggest that ammonium chloride should be used in the method for making the composition.

Response to Arguments

The Applicants' arguments submitted in their Amendment faxed on Oct. 30, 2002 (paper no. 11) have been fully considered but they are not persuasive.

- a) *The Applicants argue that their catalyst is distinct from the catalyst of U. S. Pat. 5,891,415 in that the surface area of the catalyst of U. S. Pat. 5,891,415 ranges from 1 to 5 m²/g (col. 4 Ins. 31-32), whereas the Applicants' catalyst has a surface area that is at least 4 times as much.*

The surface area that is equal to or greater than 20 m²/g set forth in the Applicants' claims is noted, however it is submitted that this difference would have been obvious to one of ordinary skill in the art at the time the invention was made, namely *to modify* the catalyst described in U. S. Pat. 5,891,415 *by increasing its surface area from*

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the 1 to 5 m²/g set forth in col. 4 Ins. 32-33 to a surface area that is even larger, such as the at least greater than 20 m²/g surface area reported in applicants' claim 1, in the manner embraced in the scope of Applicants' claims 1, 17, 28 and 29, because of the expected advantage of increasing the reactive contact surface on the catalyst to promote the reaction between the reagents that impinge it.

- b) *The Applicants argue that U. S. Pat. 5,891,415 does not disclose a metal oxide having atomically mixed iron ions and zinc ions in an oxidic lattice.*

From the discussion of the oxidic lattice containing iron ions and zinc ions atomically mixed set forth on pg. 15 Ins. 7-25 in the Applicants' specification, it reasonably appears that the Applicants are simply claiming the use of ZnFe₂O₄ (zinc ferrite spinel), however, as explained in the 103 rejection, U. S. Pat. 5,965,100 in col. 3 ln. 61 to col. 4 ln. 23 already discloses the use of spinels of the generic formula AB₂O₄ (wherein A and B are each elements selected from elements having an atomic number ranging from 21 to 30 - i. e. Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu and Zn) to promote the Claus reaction between H₂S and SO₂ to produce elemental sulfur (please also see col. 5 Ins. 42-56). The Applicants have not provided any evidence establishing that their ZnFe₂O₄ catalyst is any different from the AB₂O₄ catalyst of U. S. Pat. 5,965,100 when A is chosen to be Zn and B is chosen to be Fe: please also see the discussion of the *In re Petering* 301 F.2d 676, 681, 133 USPQ 275, 280 court decision set forth in section 2144.08(II)(A)(4)(a) in the MPEP (8th ed.) where it was established that the selection of a single species from a prior art's genus containing 20 species was anticipated by that prior art reference.

The motivation to modify the $\text{Fe}_A\text{Zn}_B\text{O}_y$ catalyst alluded to in col. 3 Ins. 46-53 in U. S. Pat. 5,891,415 so that it is in the spinel form of ZnFe_2O_4 disclosed in (at least) col. 5 Ins. 42-56 in U. S. Pat. 5,965,100 is the taught advantage of the spinel form of Claus catalysts to avoid the catalyst sulfation problems which appears to plague prior art (non-spinel?) catalysts (please see col. 3 Ins. 6-27 and col. 4 Ins. 8-23 in U. S. Pat. 5,965,100).

- c) *The Applicants argue that although U. S. Pat. 5,891,415 mentions that a carrier may be used, U. S. Pat. 5,891,415 clearly teaches away from using a catalyst on a support.*

Applicants' claim 1 ln. 1 clearly requires a "catalyst on a support". U. S. Pat. 5,891,415 in col. 4 Ins. 37-38 reports that a carrier (i. e. the Applicants' "support") can be used for the catalyst. U. S. Pat. 5,965,100 in col. 5 Ins. 55-56 reports that the balance (of the catalytic material) is made up by a support. No patentable distinction is seen or has been shown.

- d) *The Applicants argue that the person having ordinary skill in the art does not have an incentive to design a catalyst having a surface area of greater than $20 \text{ m}^2/\text{g}$.*

The argument is not persuasive for the reasons set forth in sub-paragraph (a) in this portion of the Office action

- e) *The Applicants argue that the person having ordinary skill does not have an inclination to combine the teachings of U. S. Pat. 5,891,415 and U. S. Pat. 5,965,100 because U. S. Pat. 5,891,415 discloses using a catalyst without a carrier while U. S. Pat. 5,965,100 discloses using a catalyst supported on a carrier, and U. S. Pat.*

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5,901,415 discloses that the catalyst should be free of chromium while U. S. Pat.

5,965,100 only shows a chromium-containing catalyst.

The argument is not persuasive for at least the following reasons:

- (i) There is no suggestion to "combine" either the catalysts or the processes of U. S. Pat.s 5,891,100 and 5,901,415 to arrive at some third, agglomerated process and some third, agglomerated catalyst. Rather, the 103 rejection is based on the *modification* of the form of the $\text{Fe}_\text{A}\text{Zn}_\text{B}\text{O}_y$ lattice structure of U. S. Pat. 5,891,415 so that it is in the spinel form taught in U. S. Pat. 5,965,100 for the advantages already set forth in (at least) the 103 rejection;
 - (ii) the claimed use of a support for the catalyst does not distinguish the claims from either U. S. Pat. 5,965,100 or U. S. Pat. 5,891,100 for the reasons set forth in (at least) sub-paragraph (c) in this portion of the Office Action, and
 - (iii) U. S. Pat. 5,965,100 is not limited to requiring the presence of chromium in their spinel-based catalyst, but clearly contemplates the use ZnFe_2O_4 of the Applicants' claims as one of the possible spinel catalysts that may be used for their process. The Applicants' argument has not provided any evidence that there is any unobvious distinction between their catalyst and the ZnFe_2O_4 embodiment embraced in the scope of the contemplated catalysts described in col. 5 Ins. 46-56 in U. S. Pat. 5,965,100: please also see sub-paragraph (b) in this portion of the Office Action.
- f) *The Applicants argue that the spinels are taught to show Claus activity, which is opposite of the required property for the Applicants' catalyst.*

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The Applicants' catalyst is a Claus catalyst that is alleged to exhibit essentially no reverse-Claus activity - this is not unobviously distinct from the catalyst of resulting from the modification of U. S. Pat. 5,891,415 according to the teachings of U. S. Pat. 5,965,100.

g) *The Applicants argue that the disclosure in col. 4 Ins. 8-23 in U. S. Pat. 5,965,100 that the sulfates formed on the catalyst are unstable and react with H₂S is no reason to use mixed oxides (i. e. the spinels of U. S. Pat. 5,965,100).*

The disclosure set forth in col. 4 Ins. 8-23 in U. S. Pat. 5,965,100 makes it clear that the reaction of the sulfates on the spinel catalysts with H₂S is an advantage of their catalysts over the prior art catalysts, and that the prior art catalysts suffer from poor performance due to the sulfates caked on them. This is motivation to modify the Fe_AZn_BO_y catalyst of U. S. Pat. 5,891,415 so that it is in spinel form, and, thus, arrive at the Applicants' claimed invention.

h) *The Applicants argue that neither U. S. Pat. 5,965,100 or U. S. Pat. 5,891,415 teaches how such a catalyst could be prepared.*

The claimed method for preparing the catalyst has been treated in a separate 103 rejection citing JP 56-10,338 A.

i) *The Applicants argue that their claim 19 requires a silica support, whereas U. S. Pat-415 does not disclose the use of a support, and U. S. Pat-100 discloses the use of activated alumina.*

Note that the disclosure set forth in col. 3 Ins. 5-9 in U. S. Pat. 5,891,415, that alumina promotes the reverse Claus reaction, fairly suggests that one skilled in the art

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use any conventional and typical support that is not alumina (such as the silica of Applicants' claim 19) for the carrier mentioned in col. 4 ln. 37.

j) *The Applicants argue that their claim 20 requires that the catalyst has less than 50 wt % of active catalyst material, however U. S. Pat.-415 teaches that it is not preferred to use a support, and col. 5 Ins. 54-56 in U. S. Pat.-100 teaches that at least 20 wt. percent of CuCrO₂ may be supported on alumina.*

Note that the disclosure set forth in col. 3 Ins. 25-30 in U. S. Pat. 5,891,415 that catalytic metals were added to a catalyst in amounts ranging from 1.5 to 25 percent by weight fairly suggests that the 0.1 to 50 percent by weight limitation of applicants' claim 20 is conventional and typical for the art. Also, col. 4 Ins. 37-38 in U. S. Pat. 5,891,415 clearly sets forth that a support may be used for the catalyst.

k) *The Applicants argue that the rejection of claims 21-23 over U. S. Pat. 5,891,415 in view of U. S. Pat. 5,965,100 and further in view of JP 56-10,338 (i. e., the claims directed to the method for making the catalyst) is in error because JP-338 discloses a method for making MAI₂O₄, but does not suggest a method for making a spinel that does not contain aluminum (such as the ZnFe₂O₄ resulting from the U. S. patents), or how the resulting catalyst can have a surface area that is greater than 20 m²/g. The suggested utility for the catalyst of JP-338 is different.*

Since there is a "reasonable expectation of success" that the process for making the MAI₂O₄ spinel of JP-338 can be successfully applied to make spinels other than MAI₂O₄ (such as ZnFe₂O₄), then the rejection is maintained: please see the discussion of the court decisions set forth in section 2143.02 in the MPEP (8th ed.).

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The discussion of the surface areas of the prior art's catalysts set forth on pgs. 2 and 3 in the applicants' specification (where the applicants discuss the prior art references) fairly suggests that it is known to those skilled in the art how to increase the surface area of a catalyst in as much as pg. 2 in the applicants' specification reports that the surface area of the catalyst of U. S. Pat. 4,818,740 is less than 20 m²/g and pg. 3 in the applicants' specification reports that the surface area of the catalyst of EP 409 353 is greater than 20 m²/g. If those skilled in the art were not aware of how to increase the surface area of a catalyst (in the manner that the applicants' argument suggests), then why is surface area of the catalyst of EP 409 353 greater than the surface area of the catalyst of U. S. Pat. 4,818,740? As previously stated, the motivation for one skilled in the art to increase the surface area of the catalyst is the expected advantage of increasing the amount of contact surface on the catalyst to promote the reaction between the reagents to impinge the catalyst surface.

The different utilities for the spinel of JP-338 and the Applicants' spinel are noted, but JP-338 is "analogous" art because it is directed to the same art of making spinels set forth in (at least) Applicants' claims 21-23.

No arguments have been presented in the Amendment faxed on Nov. 6, 2002 (paper no. 13).

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy C. Vanoy whose telephone number is 703-308-2540. The examiner can normally be reached on 8 hr. days.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman, can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

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Timothy Vanoy/tv
February 14, 2003

Timothy Vanoy
Timothy Vanoy
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Art Unit 1754



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